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Inflammation and infection

Emphysematous pyelonephritis on a single anatomic kidney: About a case report and literature analysis

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ABSTRACT

Emphysematous pyelonephritis (EPN) on a single kidney is an extremely uncommon necrosing infection of renal parenchyma due often to infection by a gas-producing bacteria in a patient with uncontrolled diabetes mellitus. The management associate aggressive fluid and electrolyte resuscitation with several dialysis sessions, control of blood sugar levels, and broad-spectrum antibiotics with an urgent drainage. This paper aims to describe a case of a 68-year-old diabetic male patient who presented with EPN on a single kidney managed by conservative treatment.

Introduction

EPN is a rare and severe form of acute pyelonephritis, caused by the presence of gas-producing bacteria in the kidney and perinephric region usually seen in patients with diabetes mellitus and urolithiasis. It has a high mortality rate. The diagnosis is based on imaging. The treatment is still controversial and should be discussed on a case by case. Only a few cases of EPN on a single kidney were reported in the literature to date. We report a case of EPN on a single kidney in a diabetic patient without a visible obstacle.

Case report

A 68-year-old man, type 1 diabetic, hypertensive on amlodipine, operated for treatment of right inguinal hernia 20 years ago, admitted to the emergency room for abdominal pain, ketoacidosis decompensation, and uremic syndrome. On admission, the clinical examination found a conscious patient, hemodynamically stable, dyspneic, febrile at 39,6 °C, with right lumbar tenderness, oliguric with diuresis at 300 ml/24h.

The biological assessment revealed an altered renal function with creatinine at 92 mg/l, urea at 3,1 g/l, K+ at 6.9 mmol/l, Na + at 123 mmol/l, blood sugar at 6.5 g/l, and alkaline reserves at 8 mEq/l. An infectious syndrome with CRP at 418 mg/l, and white blood cells at 26000/ml. hemoglobin at 12,3 g/dl and the ECBU revealed a leucocyturia 320,000 and hematuria at 120,000.

Abdominopelvic CT showed a single anatomical right kidney, site of emphysematous pyelonephritis complicated by 97 * 96 mm renal abscess ruptured in the intraperitoneal cavity, with a moderate abundance of pneumoperitoneum (Fig. 1).

The patient was admitted to intensive care, he had 3 dialysis sessions, insulin therapy, and had received antibiotic therapy based on ceftriaxone plus metronidazole for 48 hours continued after ECBU culture objectifying a urinary tract infection due to Pseudomonas Aeruginosa.

The patient underwent surgical drainage of abscesses with a rise of a right double J stent (Fig. 2).

The evolution was favorable, with a decrease of the infectious syndrome with apyrexia on the second postoperative day. A chronic renal failure persisting despite a resumption of normal diuresis with a creatinine plateau of 20 mg/l.

The patient was discharged on day 10 on oral antibiotics. On four weeks follow-up, the abdominopelvic CT showed a clear regression of the bubbles of air seen on the first abdominal CT scan (Fig. 3). The double J catheter was removed within six weeks.

Discussion

EPN was defined in 1962 as a necrotizing infection with gas presence in the renal parenchyma, collecting system, or perinephric tissues with a high rate of mortality up to 40–50%.[1] Of which 80% are unilateral while 20% are bilateral. In our case, it was a particular form that occurred on a single kidney, in a poorly balanced diabetic patient, with no visible obstacle.

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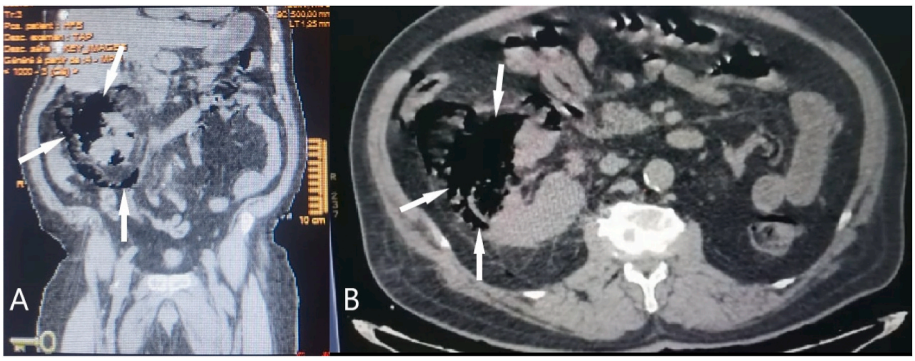

Fig. 1. Abdominopelvic scan showing single anatomical right kidney with emphysematous pyelonephritis complicated by 97 * 96 mm renal abscess ruptured in the intraperitoneal cavity.

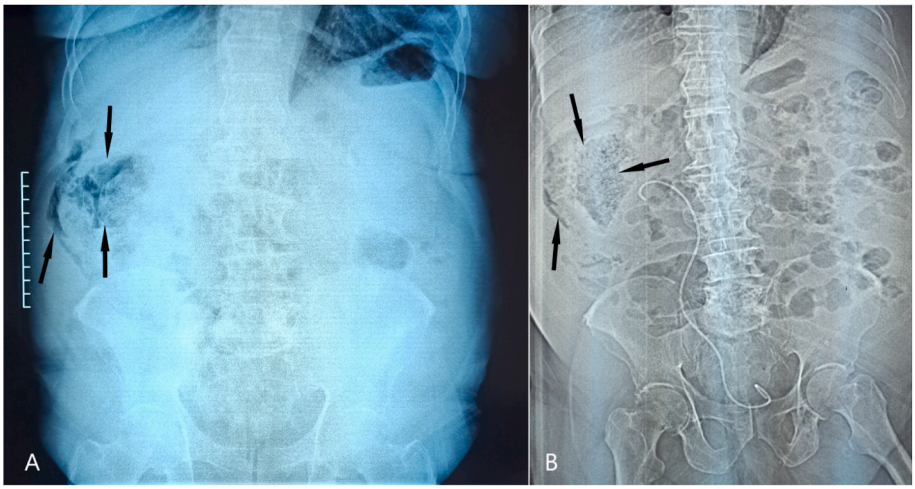

Fig. 2. Abdominal radiographs before and after the rise of the right double J stent showing the presence of gas in the renal loge.

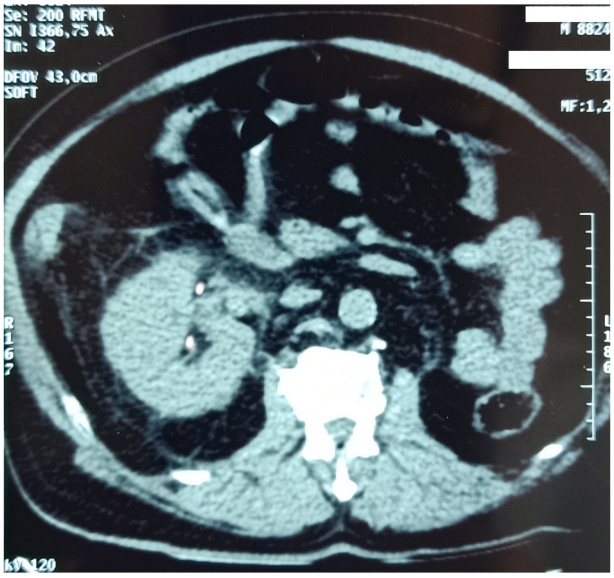

Fig. 3. CT scan control showing no gas in the right renal loge with the right double J stent in place.

Four factors are involved in the pathogenesis of EPN: infection by a gas-producing bacteria, high tissue glucose concentration, defective tissue perfusion, and impaired immune response.[1]

Most cases are presented with febrile low back pain as the main symptom for consultation. While cases with initial septic shock are rare. The average duration of the symptomatology was 5.8 days before the consultation, with extremes of 1 and 15 days.[2]

Usual organisms isolated from the culture of urine or the pus sucked in patients with EPN embraces Escherichia coli (most common), Klebsiella pneumonia, Enterococcus, Proteus mirabilis, and Pseudomonas Aeruginosa.[3]

Two classifications of EPN were found in literature, based on CT scan:

The first one is Wan and colleagues classification who has proposed 2 types,

Type I EPN: renal parenchymal with an absence of fluid content or the presence of streaky/mottled gas;

Type II EPN: the presence of renal or perirenal fluid accompanied by a bubbly gas pattern or presence of gas in the collecting system.

Furthermore, Huang and colleagues[4] proposed classification with for classes:

Class 1: gas only in the collecting system (called emphysematous pyelitis).

Class 2: gas in the renal parenchyma without extension to the extrarenal space.

Class 3A: extension of the gas or abscess to the perinephric space.

Class 3B: extension of the gas or abscess to the pararenal space.

Class 4: bilateral EPN or solitary kidney with EPN.

There is a higher risk of mortality with percutaneous drainage failure ranging from class 1 to class 4 EPN[5]

Our patient was classified type II EPN and class 4 of Wan and

colleagues, and Huang and colleagues classifications, respectively.

If left untreated, the EPN is a fatal pathology. Patients treated surgically had a better mortality rate at 30%, while patients treated only medically had a 70% of mortality rate. In different series, 90% of cases are associated with uncontrolled diabetes mellitus.[3,4] Additionally, the upper excretory tract obstruction is a predisposing factor and was found in three-quarters of patients.[2–4]

Treatment is based on broad-spectrum antibiotic therapy with appropriate surgical treatment. Conservative treatment is preferred for type 2 EPN and class 4 of Wan and Huang classifications respectively, either by surgical drainage or percutaneous drainage with a double j probe rise. In other cases, nephrectomy can be discussed on a case-by-case basis.

Conclusion

PNE on a single kidney is a rare and severe infection involving the vital prognosis. The diagnosis is based on CT scan. Treatment should be conservative based on the association of medical intensive care and urgent percutaneous, surgical or endoscopic drainage.

Declaration of competing interest

None of the contributing authors have any conflict of interest, including specific financial interests or relationships and affiliations relevant to the subject matter or materials discussed in the manuscript.

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